## SEQUENCE LISTING

<110> Splawski, Igor Keating, Mark T.	
<120> ALTERATIONS IN THE LONG QT SYNDROME GENES KVLQT1 AND SCN5A AND METHODS FOR DETECTING SAME	
<1305 2323-155	
<140> Not yet assigned <141> 2000-08-09	
<150> 60/190,057 <151> 2000-03-17	
<150> 60/147,488 <151> 1999-08-09	
<160> 4	
<170> PatentIn Ver. 2.0	
<210> 1 <211> 2028 <212> DNA <213> Homo sapiens	
<220> <221> CDS <222> (1)(2028)	
<pre>&lt;400&gt; 1 atg gcc gcg gcc tcc tcc ccg ccc agg gcc gag agg aag cgc tgg ggt 48 Met Ala Ala Ala Ser Ser Pro Pro Arg Ala Glu Arg Lys Arg Trp Gly</pre>	
tgg ggc cgc ctg cca ggc gcc cgg cgg ggc agc gcg ggc ctg gcc aag 96 Trp Gly Arg Leu Pro Gly Ala Arg Arg Gly Ser Ala Gly Leu Ala Lys 20 25 30	
aag tgc ccc ttc tcg ctg gag ctg gcg gag ggc ggc ccg gcg ggc ggc 144 Lys Cys Pro Phe Ser Leu Glu Leu Ala Glu Gly Gly Pro Ala Gly Gly 35 40 45	
gcg ctc tac gcg ccc atc gcg ccc ggc gcc cca ggt ccc gcg ccc cct 192  Ala Leu Tyr Ala Pro Ile Ala Pro Gly Ala Pro Gly Pro Ala Pro Pro  50 55 60	
gcg tcc ccg gcc gcg ccc gcg ccc cca gtt gcc tcc gac ctt ggc 240 Ala Ser Pro Ala Ala Pro Ala Ala Pro Pro Val Ala Ser Asp Leu Gly 65 70 75	)
ccg cgg ccg ccg gtg agc cta gac ccg cgc gtc tcc atc tac agc acg 288 Pro Arg Pro Pro Val Ser Leu Asp Pro Arg Val Ser Ile Tyr Ser Thr 85 90 95	3
cgc cgc ccg gtg ttg gcg cgc acc cac gtc cag ggc cgc gtc tac aac  Arg Arg Pro Val Leu Ala Arg Thr His Val Gln Gly Arg Val Tyr Asn  100  105  110	6

ttc Phe	ctc Leu	gag Glu 115	cgt Arg	ccc Pro	acc Thr	GLY	tgg Trp 120	aaa Lys	tgc Cys	ttc Phe	gtt Val	tac Tyr 125	cac	c tt	tc g ne <i>F</i>	gcc Ala	384
gtc Val	ttc Phe 130	ctc Leu	atc Ile	gtc Val	ctg Leu	gtc Val 135	tgc Cys	ctc Leu	atc Ile	ttc Phe	agc Ser 140	gtg Val	Lei	g to u S	cc a er '	acc Thr	432
atc Ile 145	gag Glu	cag Gln	tat Tyr	gcc Ala	gcc Ala 150	r an	gcc Ala	acg Thr	GJ À Gdd	act Thr 155	ctc Leu	ttc Phe	tg Tr	ga pM		gag Glu 160	480
atc Ile	gtg Val	ctg Leu	gtg Val	gtg Val 165	ttc Phe	ttc Phe	ggg Gly	acg Thr	gag Glu 170	tac Tyr	gtg Val	gto Val	cg Ar	9 -	tc eu .75	tgg Trp	528
tcc Ser	gcc Ala	ggc Gly	tgc Cys 180	cgc Arg	agc Ser	aag Lys	tac Tyr	gtg Val 185	ggc Gly	ctc Leu	tgg Trp	ggg Gly	g cg / Ar 19	٠ ي	ctg Leu	cgc Arg	576
ttt Phe	gcc Ala	cgg Arg 195	aag Lys	ccc Pro	att Ile	tcc Ser	atc Ile 200	atc Ile	gac Asp	ctc Leu	ato Ile	gto Va: 20		c q	gtg Val	gcc Ala	624
tcc Ser	atg Met 210	Val	gtc Val	ctc Leu	tgc Cys	gtg Val 215	GLY	tcc Ser	aag Lys	ggg	caç Glr 220	ı va	g ti 1 Pi	tt o	gcc Ala	acg Thr	672
tcg Ser 225	gcc		agg Arg	ggc	atc Ile 230	Arg	ttc Phe	ctg Leu	caç Glr	ato 1 116 235	e ne	g ag u Ar	g a g M	tg et	cta Leu	cac His 240	720
		c cgc Arg	caç Glr	g gga n Gly 245	GLY	acc Thr	tgç Trp	g agg Arg	cto Lev 250	ו שוד ג	g gg ı Gl	c to y Se	c g r V	tg al	gtc Val 255	ttc Phe	768
ato Ile	cac His	c cgo s Aro	c cad g Glr 260	n Glu	g cto Lev	ata Ile	a acc	acc Thi	Tie	g ta u Ty:	c at r Il	c gg e GJ	· y -	tc he 70	ctg Leu	ggc	816
ct o Lev	ate	c tto e Pho 27!	e Se	c tco r Sei	g tac Tyi	ttt Phe	gto e Va: 280	г туг	c cto	g gc u Al	t ga a Gl	.u 1)	ag g ys <i>P</i> 35	ac sp	gcg	gtg Val	864
aac Ası	c ga n Gl 29	u Se	a gg r Gl	c cgc y Arc	g gto	g gaq 1 Gli 29	u Pn	c gg e Gl	c ag y Se	c ta r Ty	c go r Al 30	a n	at o	gcg Ala	cto	g tgg 1 Trp	912
tg Trj 30	p Gl	g gt y Va	g gt 1 Va	c ac	a gt r Va 31	1 Th	c ac r Th	c at r Il	c gg e Gl	c ta y Ty 31	'I G.	gg g	ac a sp 1	aag Lys	gto Val	g ccc L Pro 320	960
ca Gl	g ac n Th	g tg r Tr	g gt p Va	c gg 1 Gl 32	А ГА	g ac s Th	c at r Il	c gc e Al	c to a Se 33	r cl	gc ti ys Pl	tc t he S	ct er	gtc Val	tt Pho 33	t gcc e Ala 5	1008
at Il	c to e Se	c tt r Ph	c tt e Ph 34	e Al	g ct a Le	c cc u Pr	a go o Al	g gg a Gl 34	λ TT	t ct e Le	eu G	gc t ly S	CL	ggg Gly 350		t gcc e Ala	1056
ct Le	g aa u Ly	ag gt ys Va 35	ıl Gl	ng ca .n Gl	g aa n Ly	g ca 's Gl	ig ag n Ar 36	:g G1	g aa n Ly	ag ca ys H:	ac t is P	ne P	ac Isn 165	cgg Arg	ca Gl	g atc n Ile	1104

									-							
ccg Pro	gcg Ala 370	gca Ala	gcc Ala	tca Ser	Leu	att Ile 375	cag Gln	acc ( Thr	gca Ala	tgg Trp	agg Arg 380	tgc Cys	tat Tyr	gct Ala	gcc Ala	1152
gag Glu 385	aac Asn	ccc Pro	gac Asp	tcc Ser	tcc Ser 390	acc Thr	tgg Trp	aag Lys	atc Ile	tac Tyr 395	atc Ile	cgg Arg	aag Lys	gcc Ala	ccc Pro 400	1200
cgg Arg	agc Ser	cac His	act Thr	ctg Leu 405	ctg Leu	tca Ser	ccc Pro	agc Ser	ccc Pro 410	aaa Lys	ccc Pro	aag Lys	aag Lys	tct Ser 415	gtg Val	1248
gtg Val	gta Val	aag Lys	aaa Lys 420	aaa Lys	aag Lys	ttc Phe	aag Lys	ctg Leu 425	gac Asp	aaa Lys	gac Asp	aat Asn	ggg Gly 430	Val	g act Thr	1296
cct Pro	gga Gly	gag Glu 435	Lys	atg Met	ctc Leu	aca Thr	gtc Val 440	ccc Pro	cat His	atc Ile	acg Thr	tgc Cys 445	Wal	e cco	c cca	1344
gaa Glu	gag Glu 450	Arg	cgg Arg	ctg Leu	gac Asp	cac His 455	ttc Phe	tct Ser	gtc Val	gac Asp	ggc Gly 460	TAT	gac Asp	ag Se	t tct r Sei	1392 r
gta Val 465	Arg	aag Lys	agc Ser	cca Pro	aca Thr 470	ctg Leu	ctg Leu	gaa Glu	gtg Val	ago Ser 475	1,100	cco Pro	cat His	t tt s Ph	c ato e Me 48	_
aga Arg	acc Thr	aac Asr	ago Ser	ttc Phe	. Ala	gag Glu	gac Asp	ctg Leu	gac Asp 490	, rec	g gaa ı Glu	a ggg	g ga y Gl	g ac u Th 49	t ct r Le 5	g 1488 u
ctg Lev	aca Thr	cco Pro	ato	Thr	cac His	atc Ile	tca Ser	cag Gln 505	Leu	g cgg	g gaa g Gl	a cad	c ca s Hi 51	S AL	g gc g Al	c 1536 a
aco Thi	att	: aaq : Ly: 51:	s Val	att L Ile	cga Arg	cgc Arg	ato Met 520	GIT	tac Ty	tt!	t gt e Va	g gc l Al 52	а шу	g aa 's Ly	ig aa ⁄s Ly	a 1584 's
tto Phe	c caq e Gli 530	n Gl	a gco n Ala	g cgg	g aaq g Lys	g cct s Pro 535	Ty	c gat r Asp	gto Vai	g cg	g ga g As 54	ρva	c at l Il	t ga .e Gi	ag ca Lu Gl	ig 1632 .n
tac Ty: 54!	r Se	g ca r Gl	g gg n Gl	c ca y Hi	c cto s Leo 550	וAS ג	c cto	c ato u Met	g gto	g cg l Ar 55	g 11	c aa e Ly	g ga s Gl	ag ci	eu Gl	ag 1680 Ln 50
ag Ar	g ag	g ct g Le	g ga u As	c ca p Gl 56	n Se	c att	t gg e Gl	g aaq y Ly:	g cc s Pr 57	0 56	a ct r Le	g tt	c at ie I.	LC D	cc g1 er Va 75	cc 1728 al
tc Se	a ga r Gl	a aa u Ly	g ag s Se 58	r Ly	g ga s As	t cg p Ar	c gg g Gl	c ag y Se 58	r As	c ac n Th	g at ir Il	c go e Gl	_y	cc c la A 90	gc c rg L	tg 1776 eu
aa As	c cg n Ar	a gt g Va 59	ıl Gl	a ga u As	c aa p Ly	g gt s Va	g ac 1 Th 60	r GI	g ct n Le	g ga u As	ic ca sp Gl	TII WI	gg c Cg L	tg g eu A	ca c la L	tc 1824 eu
at Il	c ac e Th 61	r As	ac at sp Me	g ct et Le	t ca u Hi	c ca s Gl 61	n Le	g ct u Le	c to u Se	c tt	eu ni	ac go is Gi 20	gt g Ly G	gc a ly S	gc a er T	cc 1872 hr

	******
Į.	******
	15
1	*
1	,
ļ-	į
The mil	
Ę	
The sales of the	
200	
Ľ	:
<u>_</u>	

ccc (Pro (625	ggc Gly	agc Ser	ggc Gly	ggc Gly	ccc Pro 630	ccc Pro	aga Arg	gag Glu	ggc Gly	ggg Gly 635	gcc Ala	cac His	atc Ile	T 111	cag Gln 640	1920
ccc Pro	tgc Cys	ggc Gly	agt Ser	ggc Gly 645	ggc Gly	tcc Ser	gtc Val	gac Asp	cct Pro 650	gag Glu	ctc Leu	ttc Phe	ctg Leu	ccc Pro 655	agc Ser	1968
aac Asn	acc Thr	ctg Leu	ccc Pro 660	acc Thr	tac Tyr	gag Glu	cag Gln	ctg Le <sup>-1</sup> 665	acc Thr	gtg Val	ccc Pro	agg Arg	agg Arg 670	ggc Gly	ccc Pro	2016
		ggg Gly 675														2028
<210 <211 <212 <213	.> 67 !> PI		sapi	ens												
<400 Met 1	)> 2 Ala	Ala	Ala	Ser 5	Ser	Pro	Pro	Arg	Ala 10	Glu	Arg	Lys	Arg	Trp 15	Gly	
Trp	Gly	Arg	Leu 20		Gly	Ala	Arg	Arg 25	Gly	Ser	Ala	Gly	Leu 30	Ala	Lys	
Lys	Cys	Pro 35	Phe	Ser	Leu	Glu	Leu 40	Ala	Glu	Gly	Gly	Pro 45	Ala	Gly	Gly	
Ala	Leu 50		Ala	Pro	Ile	Ala 55	Pro	Gly	Ala	Pro	Gly 60	Pro	Ala	Pro	Pro	
Ala 65	Ser	Pro	Ala	Ala	Pro 70	Ala	Ala	Pro	Pro	Val 75	Ala	Ser	Asp	Leu	Gly 80	
Pro	Arg	Pro	Pro	Val 85	Ser	Leu	Asp	Pro	Arg 90	y Val	Ser	Ile	туг	Ser 95	Thr	
			100	)				105	)				111	,	Asn	
Phe	Leu	Glu 115	Arg	Pro	Thr	: Gly	7 Trp	Lys	з Суя	s Phe	e Val	125	His	s Phe	e Ala	
Val	Phe 130		Il∈	e Val	. Leı	1 Val	Cys	s Le	ı Ile	e Phe	e Ser 140	r Val	l Le	ı Sei	Thr	
Ile 145		ı Gln	Туг	: Ala	150	a Lei	ı Ala	a Th:	r Gl	y Th: 15	r Lei	a Phe	e Tr	p Met	: Glu 160	
				165	5				17	U				17.		
			180	)			•	18	5				1 2	U	ı Arg	
Phe	Alá	Arg 195		s Pro	o Ile	e Se:	r Ile 200	e Il O	e As	p Le	u Il	e Va 20	1 Va 5	l Va:	l Ala	

Ser Met Val Val Leu Cys Val Gly Ser Lys Gly Gln Val Phe Ala Thr 220 Ser Ala Ile Arg Gly Ile Arg Phe Leu Gln Ile Leu Arg Met Leu His Val Asp Arg Gln Gly Gly Thr Trp Arg Leu Leu Gly Ser Val Val Phe Ile His Arg Gln Glu Leu Ile Thr Th' Leu Tyr Ile Gly Phe Leu Gly Leu Ile Phe Ser Ser Tyr Phe Val Tyr Leu Ala Glu Lys Asp Ala Val 280 Asn Glu Ser Gly Arg Val Glu Phe Gly Ser Tyr Ala Asp Ala Leu Trp Trp Gly Val Val Thr Val Thr Thr Ile Gly Tyr Gly Asp Lys Val Pro 315 310 Gln Thr Trp Val Gly Lys Thr Ile Ala Ser Cys Phe Ser Val Phe Ala 325 Ile Ser Phe Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val Gln Gln Lys Gln Arg Gln Lys His Phe Asn Arg Gln Ile 360 Pro Ala Ala Ser Leu Ile Gln Thr Ala Trp Arg Cys Tyr Ala Ala Glu Asn Pro Asp Ser Ser Thr Trp Lys Ile Tyr Ile Arg Lys Ala Pro 395 Arg Ser His Thr Leu Leu Ser Pro Ser Pro Lys Pro Lys Ser Val Val Val Lys Lys Lys Phe Lys Leu Asp Lys Asp Asn Gly Val Thr 425 Pro Gly Glu Lys Met Leu Thr Val Pro His Ile Thr Cys Asp Pro Pro Glu Glu Arg Arg Leu Asp His Phe Ser Val Asp Gly Tyr Asp Ser Ser 455 Val Arg Lys Ser Pro Thr Leu Leu Glu Val Ser Met Pro His Phe Met Arg Thr Asn Ser Phe Ala Glu Asp Leu Asp Leu Glu Gly Glu Thr Leu 490 Leu Thr Pro Ile Thr His Ile Ser Gln Leu Arg Glu His His Arg Ala 505 Thr Ile Lys Val Ile Arg Arg Met Gln Tyr Phe Val Ala Lys Lys 520 515 Phe Gln Gln Ala Arg Lys Pro Tyr Asp Val Arg Asp Val Ile Glu Gln 540 535

Tyr :	Ser	Gln	Gly	His	Leu 550	Asn	Leu	Met	Val	Arg 555	Ile	Lys	Glu	Leu	G3 56	ln 60		
Arg	Arg	Leu	Asp	Gln 565	Ser	Ile	Gly	Lys	Pro 570	Ser	Leu	Phe	Ile	Ser 575	Vá	al		
Ser	Glu	Lys	Ser 580	Lys	Asp	Arg	Gly	Ser 585	Asn	Thr	Ile	Gly	Ala 590	Arg	L	eu		
Asn	Arg	Val 595	Glu	Asp	Lys	Yal	Thr 600	Gln	Leu	Asp	Gln	Arg 605	Leu	Ala	ı L	eu		
Ile	Thr 610	Asp	Met	Leu	His	Gln 615	Leu	Leu	Ser	Leu	His 620	Gly	Gly	Sei	· T	hr		
Pro 625	Gly	Ser	Gly	Gly	Pro 630	Pro	Arg	Glu	Gly	Gly 635	Ala	His	Ile	Thi	c G 6	ln 40		
Pro	Cys	Gly	Ser	Gly 645	Gly	Ser	Val	Asp	Pro 650	Glu	Lev	ı Phe	. Lev	Pro 65	o S 5	Ser		
Asn	Thr	Leu	Pro 660	Thr	Tyr	Glu	Gln	Leu 665	Thi	· Val	Pro	Arç	670	g Gl )	y F	?ro		
Asp	Glu	Gly 675	Ser	•														
<21 <21	0> 3 1> 6 2> E 3> H	048 NA	sapi	lens														
	1> 0		. (604	48)														
	Ala		c tto n Pho	c cta e Leu	a tta ı Lev	a cci ı Pro	c cg	g gg	λπ	c ag r Se 0	c ag r Se	c tt r Ph	c cg e Ar	9	gg :g 1.5	ttc Phe	48	
aca Thr	cgq Arq	g gad g Glu	g to u Se: 2	c cto r Leo	g gca	a gc	c at	c ga e Gl 2	uгy	g cg s Ar	c at g Me	g gc t Al		ig aa .u Ly 80	ag ys	caa Gln	96	
gcc Ala	cgo Aro	c gg g Gl: 3	y Se	a acor Th	c ac r Th	c tt r Le	u Gl	g ga n Gl 0	g ag u Se	c co r Ar	ga ga :g Gl	u Gi	ıg ct .y L∈ .5	g co eu P	cc ro	gag Glu	144	
gaç Glu	g ga i Gl	u Al	t cc a Pr	c cg o Ar	g cc g Pr	o GI	g ct n Le 5	g ga u As	c ct p Le	g ca eu Gl	III A	ec to la Se 50	ec aa er Ly	aa a /s L	ag ys	ctg Leu	192	
cca Pro	) As	t ct p Le	c ta u Ty	t gg r Gl	y As	t cc n Pr 0	a cc	c ca o Gl	a ga .n G	Lu Le	cc at eu II 75	c go le Gi	ga ga Ly Gi	ag c lu P	cc ro	ctg Leu 80	240	
gaq Gl:	g ga ı As	c ct p Le	g ga u As	c cc sp Pr 8	c tt o Ph	c ta ie Ty	t ag r Se	jc ac er Th	ır G.	aa aa In Ly 90	ag ad ys Tl	ct ti hr Pl	cc at ne I	tc g le V	ta al 95	ctg Leu	288	

										′								
aat Asn	aaa Lys	ag sG	gc	aag Lys 100	acc Thr	atc Ile	ttc Phe	cgg Arg	ttc Phe 105	agt Ser	gcc Ala	acc Thr	aac Asn	gcc Ala 110		g t	tat Tyr	336
Val	. Le	u S 1	er 15	Pro	Phe	His	Pro	120	cgg Arg	Arg	NIG	ΑIα	125	Lyc				384
gtt Val	са Е Рі 13	s S	cg Ser	ctc Leu	ttc Phe	aac Asn	atg Met 135	ctc Leu	atc Ile	atg Met	tgc Cys	acc Thr 140	110	cto	ac n Th	nr nr	aac Asn	432
tgo Cys 145	s Va	g t 1 I	ttc Phe	atg Met	gcc Ala	cag Gln 150	cac His	gac Asp	cct Pro	cca Pro	ccc Pro 155	tgg Trp	acc Thr	aaq Lys	g ta s T	at yr	gtc Val 160	480
ga Gl	g ta u Ty	c a	acc Thr	ttc Phe	acc Thr 165	Ala	att Ile	tac Tyr	acc Thr	ttt Phe 170	gag Glu	tct Ser	cto Lev	g gto 1 Va:		ag ys 75	att Ile	528
ct Le	g go u Al	t .a .	cga Arg	gct Ala 180	Phe	tgc Cys	ctg Leu	cac His	gcg Ala 185	ttc Phe	act Thr	ttc Phe	ctt Lei	cg Ar 19	g n	ac	cca Pro	
Tr	p As	sn	Trp 195	Leu	ı Asp	) Phe	Ser	200		TIE	Met	. Alt	20	5				
tt · Ph	ie Va	ig al 10	gac Asp	ctç Lev	g ggo i Gly	aat Asr	gto Val 215	L Ser	gcc Ala	tta Leu	cgc Arg	ace Thi		c cg e Ar	ja o	gtc /al	ctc Leu	
cg Ar 22	g A	cc la	cto	aaa Lys	a act	ata r Ile 230	e Sei	a gto r Val	att L Ile	tca Ser	ggg Gly 235	у пе	g aa u Ly	g ac s Th	ec a	atc Ile	gto Val 240	_
gi Gl	g g Ly A	cc la	cto	g ato	c cade Gli	n Se	c gte	g aaq l Ly:	g aaq s Lys	cto Lev 250	TUTO	t ga a As	t gt p Va	g at 1 Me		gto Val 255		2 768 1
a c Th	ca g nr V	tc al	tto Phe	tge Cy: 26	s Le	c ago u Se	c gt r Va	c tt	t gcd e Ala 265	i re	ate u Ile	c gg e Gl	c ct y Le	, u .	ag ln 70	cto Lei	tto Phe	e 816 e
a† Me	tg g et G	gc ly	aad Asi 27	n Le	a ag u Ar	g ca g Hi	c aa s Ly	g tg s Cy 28	t gto s Val	g cg	c aa g As	c tt n Ph	10 11	ca g nr A 85	cg la	ct o	c aad i Asi	c 864 n
g G	ly T	.cc hr	aa As:	c gg n Gl	c tc y Se	c gt r Va	g ga 1 Gl 29	u Aı	c ga a As	c gg p Gl	c tt y Le	g gt u Vá 30	11 1	gg g rp G	aa lu	tc: Se:	c ct r Le	g 912 u
Ā	ac o sp I 05	tt Leu	ta Ty	c ct r Le	c ag u Se	r ga r As 31	p Pr	a ga o Gl	a aa u As	t ta n Ty	c ct r Le 31	и ь	c a	ag a ys A	ac .sn	G1	c ac y Th 32	
t S	ct ( er <i>l</i>	gat Asp	gt Va	g tt l Le	a ct eu Le 32	eu Cy	rt go 's Gl	gg aa Ly As	ic ag sn Se	c to r Se 33	Er As	sp A	ct g la G	gg a ly T	ca hr	tg Cy 33	J L L	:g 1008 :o
g	ag ( Slu (	ggc Gly	ta Ty	r Ai	gg to cg Cy 10	gc ct ys Le	a aa eu Ly	ag go ys Al	ca gg La Gl 34	y GJ	ig aa .u As	ac c	cc g ro A	sp r	cac His 350	gg Gl	c ta y Ty	ac 1056 /r

									•								
acc Thr	agc Ser	ttc Phe 355	gat Asp	tcc Ser	ttt ( Phe )	Ala '	tgg Trp 360	gcc t Ala l	ttt Phe	ctt Leu	gca Ala	ctc Leu 365	ttc Phe	cgc Arg	ct Le	ig eu	1104
atg Met	acg Thr 370	cag Gln	gac Asp	tgc Cys	Trp	gag Glu 375	cgc Arg	ctc Leu	tat Tyr	cag Gln	cag Gln 380	acc Thr	ctc Leu	agg Arg	t o	cc er	1152
gca Ala 385	ggg Gly	aag Lys	atc Ile	tac Tyr	atg Met 390	atc Tle	ttc Phe	ttc Phe	atg Met	ctt Leu 395	gtc Val	atc Ile	ttc Phe	ctg Leu		gg ly 00	1200
tcc Ser	ttc Phe	tac Tyr	ctg Leu	gtg Val 405	aac Asn	ctg Leu	atc Ile	ctg Leu	gcc Ala 410	gtg Val	gtc Val	gca Ala	atg Met	gco Ala 415		at yr	1248
gag Glu	gag Glu	caa Gln	aac Asn 420	caa Gln	gcc Ala	acc Thr	atc Ile	gct Ala 425	gag Glu	acc Thr	gag Glu	gag Glu	aag Lys 430	91	a a ı L	ag .ys	1296
cgc Arg	ttc Phe	cag Gln 435	Glu	gcc Ala	atg Met	gaa Glu	atg Met 440	ctc Leu	aag Lys	aaa Lys	gaa Glu	cac His	GIC	g gc	a I	etc Leu	1344
acc Thr	atc Ile 450	Arg	ggt Gly	gtg Val	gat Asp	acc Thr 455	gtg Val	tcc Ser	cgt Arg	agc Ser	tcc Ser 460		gaq Glu	g at u Me	g t	cc Ser	1392
cct Pro 465	Leu	gco Ala	c cca	gta Val	aac Asn 470	agc Ser	cat His	gag Glu	aga Arg	aga Arg 475	3 Sei	aaq Lys	g ago	g ag g Ar	9 .	aaa Lys 480	1440
cgç Arç	ato Met	tci Sei	t tca r Sei	a gga Gly 485	Thr	gag Glu	gag Glu	tgt Cys	ggg Gly 490	/ GI	g gad u Asp	c ago o Aro	g ct g Le	c cc u Pr 49	_	aag Lys	1488
tct Ser	gac Asp	tca Se:	a gaa r Gli 50	a gat ı Asp	ggt Gly	ccc	aga Arg	gca J Ala 505	мет	g aa : As:	t ca n Hi	t ct s Le	c ag u Se 51	T 110	c eu	acc Thr	1536
cgt Arg	g Gly	c ct y Le 51	u Se	c ago r Aro	g act g Thr	tct Ser	ato Met 520	г гуз	cca Pro	a cg o Ar	t tc g Se	c ag r Se 52		g G	ly gg	agc Ser	1584
at: Ile	t tto e Pho 53	e Th	c tt r Ph	t cgo e Aro	c ago g Aro	g cga g Arc 53!	g As	c cto p Lei	g gg ı Gl	t to y Se	t ga er Gl 54	u Aı	a ga a As	at t sp P	tt he	gca Ala	1632
ga As 54	p As	t ga p Gl	a aa u As	c age	c acar Thi	c Ala	g cg a Ar	g gaq g Gl	g ag ı Se	c ga r Gl 55	.u se	go ca er Hi	c ca s Hi	ac a is T	ca hr	tca Ser 560	1680
ct Le	g ct u Le	g gt u Va	g co al Pr	c tg o Tr 56	p Pr	c ct o Le	g cg u Ar	c cg g Ar	g ac g Th 57	I SE	gt go er Al	cc ca La Gl	ag go Ln G	ry c	ag 1n 75	ccc Pro	1728
ag Se	t co r Pr	c gg	ga ac Ly Th 58	cc tc ir Se 30	g gc r Al	t cc a Pr	t gg o Gl	с са у Ні 58	s Al	c ci .a Le	tc ca eu Hi	at go is G	r À n	aa a ys I 90	ag 'ys	aac Asn	1776
aç Se	gc ac er Th	ır Va	tg ga al As 95	ac tg sp Cy	ıc aa 's As	t gg n Gl	g gt y Va 60	ıı va	c to	er L	ta c eu L	eu G	gg g ly A 05	ca q la (	gc	gac Asp	1824

	,								-							
cca Pro	gag Glu 610	gcc Ala	aca Thr	tcc Ser	cca Pro	gga Gly 615	agc Ser	cac His	ctc Leu	ctc Leu	cgc Arg 620	cct Pro	gtg Val	atg Met	cta Leu	1872
gag Glu 625	cac His	ccg Pro	cca Pro	gac Asp	acg Thr 630	acc Thr	acg Thr	cca Pro	tcg Ser	gag Glu 635	gag Glu	cca Pro	ggc Gly	ggc Gly	ccc Pro 640	1920
cag Gln	atg Met	ctg Leu	acc Thr	tcc Ser 645	cag Gln	gct Ala	ccg Pro	tgt Cyr	gta Val 650	gat Asp	ggc Gly	ttc Phe	gag Glu	gag Glu 655	cca Pro	1968
gga Gly	gca Ala	cgg Arg	cag Gln 660	cgg Arg	gcc Ala	ctc Leu	agc Ser	gca Ala 665	gtc Val	agc Ser	gtc Val	ctc Leu	aca Thr 670	agc Ser	gca Ala	2016
ctg Leu	gaa Glu	gag Glu 675	Leu	gag Glu	gag Glu	tct Ser	cgc Arg 680	cac His	aag Lys	tgt Cys	cca Pro	cca Pro 685	tgc Cys	tgg Trp	aac Asn	2064
cgt Arg	ctc Leu 690	Ala	cag Gln	cgc Arg	tac Tyr	ctg Leu 695	atc Ile	tgg Trp	gag Glu	tgc Cys	tgc Cys 700	FIO	ctg Leu	tgg Trp	atg Met	2112
tcc Ser 705	Ile	aag Lys	cag Gln	gga Gly	gtg Val 710	гÀг	ttg Leu	gtg Val	gtc Val	atg Met 715	nsp	ccg Pro	ttt Phe	act Thr	gac Asp 720	2160
ctc Leu	acc Thr	ato Ile	act Thr	atg Met 725	Cys	atc Ile	gta Val	ctc Leu	aac Asn 730	Thi	cto Lev	tto Phe	atç Met	g gcg : Ala 735	ctg Leu	2208
gag Glu	cac His	tac Tyı	aac Asr 740	n Met	aca Thr	agt Ser	gaa Glu	tto Phe 745	GIL	gag Glu	g ato 1 Met	g cto Leu	g caq 1 Glr 750	i vai	gga Gly	2256
aac Asn	ctg Lev	gto Val	L Phe	aca Thr	Gly ggg	att Ile	ttc Phe	Thr	gca Ala	gaq Glu	g ato 1 Met	g aco	. FIII	c aaq e Lys	g atc s Ile	2304
att Ile	gcc Ala 770	a Le	c gad ı Ası	c ccc p Pro	tac Tyr	tac Tyr 775	тул	tto Phe	caa e Glr	a caq n Gli	g gg n Gly 78	y Iri	g aad o Asi	c ato n Ile	ttc e Phe	2352
gad Asp 785	Sei	c ate	c ate	c gto e Val	ato 1 116 790	e Lei	ago 1 Sei	c cto	ato 1 Met	g gad 5 Gli 79	и ье	g gg u Gl	c ct y Le	g tco u Se:	c cgc r Arg 800	2400
ato Me	g ago	c aa r As	c tt n Le	g tog u Sei 80!	r Val	g cto	g cgo	c tco g Se:	c tte r Phe 81	e Ar	c ct g Le	g ct u Le	g cg u Ar	g gt g Va 81	c ttc 1 Phe 5	2448
aac Ly:	g cto s Le	g gc u Al	c aa a Ly 82	s Se	a tgo r Tr	g cc p Pr	c ac	c cte r Le 82	u As	c ac n Th	a ct r Le	c at u Il	c aa e Ly 83	2 11	c atc e Ile	2496
gg Gl	g aa y As	c tc n Se 83	r Va	g gg 1 Gl	g gc y Al	a ct a Le	g gg u Gl 84	y As	c ct n Le	g ac u Th	a ct r Le	g gt u Va 84	т пе	a gc u Al	c atc a Ile	2544
at Il	c gt e Va 85	l Ph	c at e Il	c tt e Ph	t gc e Al	t gt a Va 85	ı va	g gg l Gl	c at y Me	g ca t Gl	ig ct .n Le 86	u Er	t gg ie Gl	jc aa .y Ly	g aac s Asn	2592

tac Tyr 865	tcg Ser	gag Glu	ctg Leu	agg Arg	gac Asp 870	agc Ser	gac Asp	tca Ser	ggc Gly	ctg Leu 875	ctg Leu	cct Pro	cġc Arg	tgg Trp	cac His 880	2640
atg Met	atg Met	gac Asp	ttc Phe	ttt Phe 885	cat His	gcc Ala	ttc Phe	cta Leu	atc Ile 890	atc Ile	ttc Phe	cgc Arg	atc Ile	ctc Leu 895	tgt Cys	2688
gga Gly	gag Glu	tgg Trp	atc Ile 900	gag Glu	acc Thr	atg Met	tgg Trp	gac Asp 905	tgc Cys	atg Met	gag Glu	gtg Val	tcg Ser 910	Gly ggg	cag Gln	2736
tca Ser	tta Leu	tgc Cys 915	ctg Leu	ctg Leu	gtc Val	ttc Phe	ttg Leu 920	ctt Leu	gtt Val	atg Met	gtc Val	att Ile 925	ggc Gly	aac Asn	ctt Leu	2784
gtg Val	gtc Val 930	ctg Leu	aat Asn	ctc Leu	ttc Phe	ctg Leu 935	gcc Ala	ttg Leu	ctg Leu	ctc Leu	agc Ser 940	tcc Ser	ttc Phe	agt Ser	gca Ala	2832
gac Asp 945	aac Asn	ctc Leu	aca Thr	gcc Ala	cct Pro 950	gat Asp	gag Glu	gac Asp	aga Arg	gag Glu 955	atg Met	aac Asn	aac Asn	ctc Leu	cag Gln 960	2880
ctg Leu	gcc Ala	ctg Leu	gcc Ala	cgc Arg 965	atc Ile	cag Gln	agg Arg	ggc Gly	ctg Leu 970	Arg	ttt Phe	gtc Val	aag Lys	cgg Arg 975	acc	2928
acc Thr	tgg Trp	gat Asp	ttc Phe 980	Cys	tgt Cys	ggt Gly	ctc Leu	ctg Leu 985	Arg	cac His	cgg Arg	cct Pro	cag Gln 990	г гуз	ccc Pro	2976
gca Ala	gcc Ala	ctt Leu 995	Ala	gcc Ala	cag Gln	ggc Gly	cag Gln 1000	Leu	ccc Pro	ago Ser	tgc Cys	att 1005	HIC	acc Thr	ccc Pro	3024
tac Tyr	tcc Ser 1010	Pro	cca Pro	ccc Pro	cca Pro	gag Glu 1015	Thr	gag Glu	aaç Lys	g gtg Val	p cct Pro 1020	Pro	aco Thi	cgc Arg	aag g Lys	3072
gaa Glu 102	Thr	cag Gln	ttt Phe	gag Glu	gaa Glu 1030	ı G13	gag Glu	caa Gln	cca Pro	ggc Gly 1035	/ GII	g ggo n Gly	c aco	c ccc	ggg Gly 1040	3120
gat Asp	cca Pro	gaç Glü	g cco	gto Val	. Cys	gto Val	g ccc L Pro	ato Ile	gct Ala 1050	a val	g gco l Ala	c gad a Gl	g tca u Se:	a gad r Asj 105	c aca p Thr 5	3168
gat Asp	gac Asp	caa Glr	a gaa n Glu 1060	ı Glı	g gat ı Asp	gaq Gli	g gaq ı Glu	g aad 1 Asr 1065	ı Se	c cto	g gg u Gl	c ac y Th	g ga r Gl 107	u Gi	g gag u Glu	3216
tco Sei	ago Sei	aaq Lys	s Glı	g caq n Glr	g gaa n Glu	a tco u Se:	c caq r Gli 1080	n Pro	t gte o Va	g tc	c gg r Gl	c tg y Tr 108	Бъг	c ag o Ar	a ggc g Gly	3264
cct Pro	cc Pro 1090	a Ası	t to p Se:	c ago	g ac	c tg r Tr 109	p Sei	c cad	g gt n Va	g tc 1 Se	a gc r Al 110	a In	t gc r Al	c tc a Se	c tct r Ser	3312
gaq Gli 110	ı Ala	c gad a Gli	g gc	c agi a Sei	t gc r Al 111	a Se	t cad	g gc	c ga a As	c tg p Tr 111	p Ar	g ca g Gl	g ca n Gl	g tg n Tr	g aaa p Lys 1120	3360

gcg Ala	gaa Glu	ccc Pro	cag Gln 1	gcc o Ala 1 125	cca (	ggg Gly	tgc Cys	GTA (	gag Glu 130	acc ( Thr	cca ( Pro (	gag ( Glu i		agt Ser 135	tgc Cys	3408
tcc Ser	gag Glu	Gly	agc Ser 1140	aca (	gca Ala	gac Asp	Met	acc a Thr i 145	aac Asn	acc Thr	gct ( Ala (	GIU	ctc Leu 150	ctg Leu	gag Glu	3456
cag Gln	Ile	cct Pro	gac Asp	ctc Leu	ggc Gly	GIn	gat Asp .160	gtc Va!	aag Lys	gac Asp	FIO	gag Glu 165	gac Asp	tgc Cys	ttc Phe	3504
Thr	gaa Glu L170	ggc Gly	tgt Cys	gtc Val	Arg	cgc Arg 175	tgt Cys	ccc Pro	tgc Cys	Cys	gcg Ala .180	gtg Val	gac Asp	acc Thr	aca Thr	3552
cag Gln 118	Ala	cca Pro	ggg Gly	Lys	gtc Val 190	tgg Trp	tgg Trp	cgg Arg	Leu	cgc Arg 1195	aag Lys	acc Thr	tgc Cys	- 1 -	cac His 1200	3600
atc Ile	gtg Val	gag Glu	cac His	agc Ser 1205	tgg Trp	ttc Phe	gag Glu	THE	ttc Phe 1210	atc Ile	atc Ile	ttc Phe	1100	atc Ile 1215	cta Leu	3648
ctc Leu	agc Ser	agt Ser	gga Gly 1220	gcg Ala	ctg Leu	gcc Ala	Phe	gag Glu 1225	gac Asp	atc Ile	tac Tyr	пeа	gag Glu 1230	gag Glu	cgg Arg	3696
aag Lys	acc Thr	atc 11e	aag Lys	gtt Val	ctg Leu	ctt Leu	gag Glu 1240	Tyr	gcc Ala	gac Asp	гAг	atg Met 1245	FILE	aca Thr	tat Tyr	3744
Val	tto Phe 1250	· Val	g ctg L Leu	gag Glu	Met	cto Leu 1255	Leu	aag Lys	tgg Trp	gtg Val	gcc Ala 1260	тÀт	ggc	tto Phe	aag Lys	3792
aag Lys 126	Туг	tto Phe	c acc e Thr	Asn	gcc Ala 1270	Trp	tgc Cys	tgg Trp	cto	gac Asp 1275	FIIE	ctc Leu	ato Ile	gta Val	a gac l Asp 1280	3840
gto Val	tct Sei	cto Le	g gto u Val	agc Ser 1285	Leu	gto Val	g gcc L Ala	aac Asn	acc Thr 1290	. ner	g ggc i Gly	ttt Phe	gcc Ala	ga Gl: 129	g atg u Met 5	3888
ggo Gly	c cc y Pro	c at	c aag e Lys 1300	s Ser	cto Lev	g cgo	g acq g Thi	g ctg Leu 1305	r wr	g gca	a cto a Leu	cgt Arg	cct g Pro 1310		g aga u Arg	3936
gci Ala	t ct	g tc u Se 131	r Arg	a ttt g Phe	gaç Glu	g gg ı Gl	c ato y Med 132	C ALC	g gto g Vai	g gto l Va	g gto l Val	c aat L Asi 132		c ct a Le	g gtg u Val	3984
gg Gl	c gc y Al 133	a Il	c cc e Pr	g tco o Sei	c ato	c at e Me 133	t As	c gto n Val	c ct	c ct	c gto u Vai 1340	т су	c ct s Le	c at u Il	c ttc e Phe	4032
tg Tr 13	р Le	c at u Il	c tte e Ph	c ago e Sei	c ater Ile 135	е ме	g gg t Gl	c gto y Vai	g aa l As	c ct n Le 135	u Em	t gc e Al	g gg a Gl	g aa y Ly	g ttt vs Phe 1360	-
gg Gl	g ag y Ar	g to	gc at vs Il	c aad e Asi 136	n Gl	g ac n Th	a ga r Gl	g gga u Gl	a ga y As 137	р ге	g cc u Pr	t tt o Le	g aa u As	c ta n Ty 137	nc aco yr Thi 75	a 4128

atc Ile	gtg Val	Asn	aac Asn 380	aag Lys	agc Ser	cag Gln	tgt ( Cys (	gag Glu 385	tcc Ser	ttg Leu	aac : Asn :	ьeu	acc Thr 390	gga Gly	gaa Glu	4176
ttg Leu	Tyr	tgg Trp 395	acc Thr	aag Lys	gtg Val	Lys	gtc Val .400	aac Asn	ttt Phe	gac Asp	Asn	gtg Val 405	ggg Gly	gcc Ala	G] À ààà	4224
Tyr	ctg Leu 1410	gcc Ala	ctt Leu	ctg Leu	Gln	gtg Val 415	gca Ala	aca Thr	ttt Phe	Lys	ggc Gly 420	tgg Trp	atg Met	gac Asp	att Ile	4272
atg Met 142	Tyr	gca Ala	gct Ala	Val	gac Asp 1430	tcc Ser	agg Arg	ggg Gly	Tyr	gaa Glu .435	gag Glu	cag Gln	cct Pro	GIN	tgg Trp L440	4320
gaa Glu	tac Tyr	aac Asn	Leu	tac Tyr 1445	atg Met	tac Tyr	atc Ile	Tyr	ttt Phe 1450	gtc Val	att Ile	ttc Phe	He	atc Ile 1455	ttt Phe	4368
ggg Gly	tct Ser	Phe	ttc Phe 1460	Thr	ctg Leu	aac Asn	ctc Leu	ttt Phe 1465	att Ile	ggt Gly	gtc Val	ıте	att Ile 1470	gac Asp	aac Asn	4416
ttc Phe	Asn	caa Gln 1475	Gln	aag Lys	aaa Lys	Lys	tta Leu 1480	ggg	ggc Gly	cag Gln	Asp	atc Ile 1485	ttc Phe	atg Met	aca Thr	4464
gag Glu	gag Glu 1490	Gln	aag Lys	aag Lys	Tyr	tac Tyr 1495	Asn	gcc Ala	atg Met	Lys	aag Lys 1500	ctg Leu	ggc Gly	tcc Ser	aag Lys	4512
aag Lys 150	Pro	cag Gln	aag Lys	Pro	atc Ile 1510	Pro	cgg Arg	ccc Pro	Leu	aac Asn 1515	Lys	tac Tyr	cag Gln	ggc Gly	ttc Phe 1520	4560
ata Ile	tto Phe	gac Asp	att Ile	gtg Val 1525	Thr	aag Lys	cag Gln	Ala	ttt Phe 1530	Asp	gtc Val	acc Thr	ato Ile	atg Met 1535	ttt Phe	4608
cto	g ato	tgc Cys	tto Lev 1540	ı Asn	atg Met	gtg Val	. Thr	atg Met 1545	Met	gtg Val	gag Glu	aca Thr	gat Asr 1550	ASP	caa Gln	4656
agt Sei	cct Pro	gaç Glu 1555	ı Lys	a ato	aac Asn	ato Ile	ttg Leu 1560	Ala	aag Lys	ato Ile	aac Asn	ctg Leu 1565	r rei	ttt ı Phe	gtg Val	4704
gco Ala	ato a Ile 1570	e Phe	c aca e Thi	a ggo r Gly	gag Glu	tgt Cys 1575	: Ile	gtc Val	aag Lys	cto Lev	g gct 1 Ala 1580	Alā	cto Le	g cgo u Aro	c cac g His	4752
ta Ty:	r Ty	tto Phe	c acc e Th:	c aad r Asn	ago n Ser 1590	r Trp	g aat o Asn	ato Ile	tto Phe	gad Asp 1595	o Phe	gto Val	g gt: Va	t gto l Val	c atc l Ile 1600	4800
ct: Le:	c tco u Sei	c ato	c gto e Vai	g ggq 1 Gly 1605	y Thi	gtç Val	g cto l Lev	tco Ser	g gad Asp 1610	o Ile	c ato	caç e Glr	g aa n Ly	g tao s Ty: 161!	c ttc r Phe 5	4848
tt. Ph	c tco e Se:	c cc r Pr	g aco o Thi 162	r Lei	c tto u Phe	c cga e Arg	a gto g Val	ato 1 Ile 1625	e Arç	c cto	g gco u Ala	c cga a Arg	a at g Il 163	e GI	c cgc y Arg	4896

atc c	eu .	aga Arg 635	ctg Leu	atc Ile	cga Arg	Gly	gcc Ala .640	aag Lys	ggg Gly	atc Ile	Arg	acg Thr 645	ctg Leu	ctc Leu	ttt Phe	4944
gcc c Ala L 16	tc eu 550	atg Met	atg Met	tcc Ser	Leu	cct Pro .655	gcc Ala	ctc Leu	ttc Phe	Asn	atc Ile .660	ggg ggg	ctg Leu	ctg Leu	ctc Leu	4992
ttc c Phe I 1665	etc Leu	gtc Val	atg Met	Phe	atc Ile .670	tac Tyr	tcc Ser	atc Il€	Phe	ggc Gly L675	atg Met	gcc Ala	aac Asn	Phe	gct Ala 1680	5040
tat g Tyr V	gtc /al	aag Lys	Trp	gag Glu 1685	gct Ala	ggc Gly	atc Ile	Asp	gac Asp 1690	atg Met	ttc Phe	aac Asn	Phe	cag Gln 1695	acc Thr	5088
ttc q Phe A	gcc Ala	Asn	agc Ser 1700	atg Met	ctg Leu	tgc Cys	Leu	ttc Phe 1705	cag Gln	atc Ile	acc Thr	Thr	tcg Ser 1710	gcc Ala	ggc Gly	5136
tgg (	Asp	ggc Gly 715	ctc Leu	ctc Leu	agc Ser	Pro	atc Ile 1720	ctc Leu	aac Asn	act Thr	Gly	ccg Pro 1725	ccc Pro	tac Tyr	tgc Cys	5184
gac o Asp l	ccc Pro 730	act Thr	ctg Leu	ccc Pro	Asn	agc Ser 1735	aat Asn	ggc Gly	tct Ser	Arg	ggg Gly 1740	gac Asp	tgc Cys	ggg Gly	agc Ser	5232
cca ( Pro 2 1745	gcc Ala	gtg Val	ggc Gly	Ile	ctc Leu 1750	ttc Phe	ttc Phe	acc Thr	Thr	tac Tyr 1755	atc Ile	atc Ile	atc Ile	tcc Ser	ttc Phe 1760	5280
ctc (	atc Ile	gtg Val	gtc Val	aac Asn 1765	atg Met	tac Tyr	att Ile	Ala	atc Ile 1770	Ile	ctg Leu	gag Glu	aac Asn	tto Phe 1775	ser	5328
gtg ( Val )	gcc Ala	Thr	gag Glu 1780	Glu	agc Ser	acc Thr	gag	ccc Pro 1785	Leu	agt Ser	gag Glu	gac Asp	gac Asp 1790	Phe	gat Asp	5376
atg Met	Phe	tat Tyr 1795	gag Glu	atc Ile	tgg Trp	gag Glu	aaa Lys 1800	Phe	gac Asp	cca Pro	Glu	gcc Ala 1805	Thr	caç Glr	ttt Phe	5424
Ile	gag Glu 810	tat Tyr	tcg Ser	gtc Val	ctg Leu	tct Ser 1815	Asp	ttt Phe	gcc Ala	gac Asp	gcc Ala 1820	Leu	tct Ser	gaç Glu	g cca 1 Pro	5472
ctc Leu 1825	Arg	atc Ile	gcc	Lys	Pro 1830	Asr	caç Glr	g ata n Il∈	ago Ser	ctc Leu 1835	ı Ile	aac Asr	ato Met	g gad : Asp	c ctg Leu 1840	5520
ccc Pro	atg Met	gtg Val	agt Sei	ggg Gly 1845	Asp	cgo Aro	ato J Ile	c cat e His	tgc Cys 1850	s Met	g gac : Asp	att Ile	cto Le	tt! Phe 185	t gcc e Ala 5	5568
ttc Phe	acc Thr	aaa Lys	ago Aro 1860	y Val	cto Lev	g Gly	g gaq 7 Gli	g tct i Sei 1865	Gly	g gaç y Glu	g atg ı Met	gad Asp	gco Ala 1870	а ье	g aag u Lys	5616
atc Ile	Gln	ato Met 1875	: Glı	g gag ı Glu	g aaq 1 Lys	g tto s Phe	ato e Met 1880	t Ala	a gco a Ala	c aad a Asr	c cca n Pro	tco Ser 188!	c rA	g ates	c tcc e Ser	5664

									14							
tac Tyr 1	gag Glu 890	ccc Pro	atc Ile	acc Thr	Thr	aca Thr 895	ctc Leu	cgg Arg	cgc Arg	Lys	cac His 900	gaa Glu	gag Glu	gtg Val	tcg Ser	5712
gcc Ala 1905	Met	gtt Val	atc Ile	Gln	aga Arg 910	gcc Ala	ttc Phe	cgc Arg	Arg	cac His 915	ctg Leu	ctg Leu	caa Gln	Arg	tct Ser 1920	5760
ttg Leu	aag Lys	cat His	Ala	tcc Ser 1925	ttc Phe	ctc Leu	ttc Phe	Arg	cag Gln .930	cag Gln	gcg Ala	ggc Gly	Ser	ggc Gly .935	ctc Leu	5808
tcc Ser	gaa Glu	Glu	gat Asp .940	gcc Ala	cct Pro	gag Glu	Arg	gag Glu 945	ggc Gly	ctc Leu	atc Ile	Ala	tac Tyr 1950	gtg Val	atg Met	5856
agt Ser	Glu	aac Asn 1955	ttc Phe	tcc Ser	cga Arg	Pro	ctt Leu .960	ggc Gly	cca Pro	ccc Pro	Ser	agc Ser 1965	tcc Ser	tcc Ser	atc Ile	5904
Ser	tcc Ser .970	act Thr	tcc Ser	ttc Phe	Pro	ccc Pro 1975	tcc Ser	tat Tyr	gac Asp	Ser	gtc Val 980	act Thr	aga Arg	gcc Ala	acc Thr	5952
agc Ser 1985	Asp	aac Asn	ctc Leu	cag Gln	gtg Val 1990	cgg Arg	ggg Gly	tct Ser	Asp	tac Tyr 1995	agc Ser	cac His	agt Ser	Glu	gat Asp 2000	6000
ctc	gcc	gac	ttc	ccc	cct	tct	ccg	gac	agg Arg	gac	cgt	gag	tcc Ser	atc	gtg Val	6048
Leu	Ата	Asp		2005	PIO	Ser	FIO	ASP 2	2010	nap	nrg	Olu		2015	Vul	
<210 <211 <212	)> 4 L> 20 2> Pl	016	;	2005	PIO	361	110	ASP .	2010	мар	ni g	J.u			Vul	
<210 <211 <212 <213	)> 4 l> 20 2> P1 3> H	016 RT omo :	sapi	2005 ens					2010	Ser			:	2015	Phe	
<210 <211 <212 <213 <400 Met	)> 4 l> 20 2> P! 3> Ho )> 4 Ala	016 RT omo :	sapi Phe	ens Leu 5	Leu	Pro	Arg	Gly	Thr 10 Lys	Ser	Ser	Phe	Arg	Arg 15 Lys	Phe	
<210 <211 <212 <213 <400 Met 1	)> 4 l> 20 2> P1 3> H0 )> 4 Ala	O16 RT omo : Asn Glu	sapi Phe Ser 20	ens Leu 5 Leu	Leu	Pro Ala	Arg Ile	Gly Glu 25	Thr 10 Lys	Ser	Ser	Phe	Arg Glu 30	Arg 15 Lys	Phe	
<210 <211 <212 <213 <400 Met 1 Thr	)> 4 l> 20 2> P1 3> H6 Ala Arg	Olf RT omo : Asn Glu Gly 35 Ala	Phe Ser 20 Ser	ens Leu 5 Leu Thr	Leu Ala Thr	Pro Ala Leu	Arg Ile Gln 40 Leu	Gly Glu 25 Glu	Thr 10 Lys Ser	Ser Arg	Ser Met	Phe Ala Gly 45	Arg Glu 30	Arg 15 Lys Pro	Phe	
<210 <211 <212 <213 <400 Met 1 Thr	0)> 4 1> 20 2> PP 3> Hand Arg Arg Glu 50	Olf RT omo : Asn Glu Gly 35 Ala	Ser 20 Ser Pro	ens Leu 5 Leu Thr	Leu Ala Thr	Pro Ala Leu Gln 55	Arg Ile Gln 40 Leu	Gly Glu 25 Glu Asp	Thr 10 Lys Ser	Ser Arg Arg	Ser Met Glu Ala 60	Phe Ala Gly 45	Arg Glu 30 Leu	Arg 15 Lys Pro	Phe Gln Glu	
<210 <211 <212 <213 <400 Met 1 Thr Ala Glu Pro 65	0)> 4 1> 20 2> PP 2> PP 3> H Ala Arg Arg Glu 50 Asp	Olf RT omo : Asn Glu Gly 35 Ala Leu	Ser 20 Ser Pro	ens Leu 5 Leu Thr Arg	Leu Ala Thr Pro Asn 70	Pro Ala Leu Gln 55 Pro	Arg Ile Gln 40 Leu Pro	Gly Glu 25 Glu Asp	Thr 10 Lys Ser Leu Glu	Ser Arg Arg Gln Leu 75	Ser Met Glu Ala 60	Phe Ala Gly 45 Ser	Arg Glu 30 Leu Lys	Arg 15 Lys Pro	Phe Gln Glu Leu 80 Leu	
<210 <211 <212 <213 <400 Met 1 Thr Ala Glu Pro 65 Glu	0)> 4 1> 20 2> PP 2> PP 3> H Ala Arg Arg Glu 50 Asp	Olf RT omo : Asn Glu Gly 35 Ala Leu	Ser 20 Ser Pro Tyr	ens Leu 5 Leu Thr Arg Gly Pro 85 Thr	Leu Ala Thr Pro Asn 70 Phe	Pro Ala Leu Gln 55 Pro	Arg Ile Gln 40 Leu Pro	Gly Glu 25 Glu Asp Gln Thr	Thr 10 Lys Ser Leu Glu Gln 90 Ser	Ser Arg Arg Gln Leu 75	Ser Met Glu Ala 60 Ile	Phe Ala Gly 45 Ser	Arg Glu 30 Leu Lys Glu	Argg 15 Lys Pro Lys Pro Lys Lys	Phe Gln Glu Leu 80 Leu	

Val His Ser Leu Phe Asn Met Leu Ile Met Cys Thr Ile Leu Thr Asn 135 Cys Val Phe Met Ala Gln His Asp Pro Pro Pro Trp Thr Lys Tyr Val 150 Glu Tyr Thr Phe Thr Ala Ile Tyr Thr Phe Glu Ser Leu Val Lys Ile 170 Leu Ala Arg Ala Phe Cys Leu His Ala Phe Thr Phe Leu Arg Asp Pro 185 Trp Asn Trp Leu Asp Phe Ser Val Ile Ile Met Ala Tyr Thr Thr Glu 200 Phe Val Asp Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu Lys Thr Ile Ser Val Ile Ser Gly Leu Lys Thr Ile Val Gly Ala Leu Ile Gln Ser Val Lys Lys Leu Ala Asp Val Met Val Leu Thr Val Phe Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe 265 Met Gly Asn Leu Arg His Lys Cys Val Arg Asn Phe Thr Ala Leu Asn Gly Thr Asn Gly Ser Val Glu Ala Asp Gly Leu Val Trp Glu Ser Leu Asp Leu Tyr Leu Ser Asp Pro Glu Asn Tyr Leu Leu Lys Asn Gly Thr Ser Asp Val Leu Leu Cys Gly Asn Ser Ser Asp Ala Gly Thr Cys Pro 325 Glu Gly Tyr Arg Cys Leu Lys Ala Gly Glu Asn Pro Asp His Gly Tyr Thr Ser Phe Asp Ser Phe Ala Trp Ala Phe Leu Ala Leu Phe Arg Leu 360 Met Thr Gln Asp Cys Trp Glu Arg Leu Tyr Gln Gln Thr Leu Arg Ser Ala Gly Lys Ile Tyr Met Ile Phe Phe Met Leu Val Ile Phe Leu Gly 395 Ser Phe Tyr Leu Val Asn Leu Ile Leu Ala Val Val Ala Met Ala Tyr 405 Glu Glu Gln Asn Gln Ala Thr Ile Ala Glu Thr Glu Glu Lys Glu Lys 425 Arg Phe Gln Glu Ala Met Glu Met Leu Lys Lys Glu His Glu Ala Leu 435 Thr Ile Arg Gly Val Asp Thr Val Ser Arg Ser Ser Leu Glu Met Ser 455

Pro Leu Ala Pro Val Asn Ser His Glu Arg Arg Ser Lys Arg Arg Lys 470 Arg Met Ser Ser Gly Thr Glu Glu Cys Gly Glu Asp Arg Leu Pro Lys Ser Asp Ser Glu Asp Gly Pro Arg Ala Met Asn His Leu Ser Leu Thr Arg Gly Leu Ser Arg Thr Ser Met Lys Pro Arg Ser Ser Arg Gly Ser 520 Ile Phe Thr Phe Arg Arg Arg Asp Leu Gly Ser Glu Ala Asp Phe Ala Asp Asp Glu Asn Ser Thr Ala Arg Glu Ser Glu Ser His His Thr Ser Leu Leu Val Pro Trp Pro Leu Arg Arg Thr Ser Ala Gln Gly Gln Pro Ser Pro Gly Thr Ser Ala Pro Gly His Ala Leu His Gly Lys Lys Asn Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Leu Gly Ala Gly Asp 600 Pro Glu Ala Thr Ser Pro Gly Ser His Leu Leu Arg Pro Val Met Leu Glu His Pro Pro Asp Thr Thr Thr Pro Ser Glu Glu Pro Gly Gly Pro Gln Met Leu Thr Ser Gln Ala Pro Cys Val Asp Gly Phe Glu Glu Pro 650 Gly Ala Arg Gln Arg Ala Leu Ser Ala Val Ser Val Leu Thr Ser Ala Leu Glu Glu Leu Glu Glu Ser Arg His Lys Cys Pro Pro Cys Trp Asn 680 Arg Leu Ala Gln Arg Tyr Leu Ile Trp Glu Cys Cys Pro Leu Trp Met 695 Ser Ile Lys Gln Gly Val Lys Leu Val Val Met Asp Pro Phe Thr Asp Leu Thr Ile Thr Met Cys Ile Val Leu Asn Thr Leu Phe Met Ala Leu Glu His Tyr Asn Met Thr Ser Glu Phe Glu Glu Met Leu Gln Val Gly 745 Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Thr Phe Lys Ile 760 Ile Ala Leu Asp Pro Tyr Tyr Tyr Phe Gln Gln Gly Trp Asn Ile Phe 770 780 Asp Ser Ile Ile Val Ile Leu Ser Leu Met Glu Leu Gly Leu Ser Arg 795 790

Met Ser Asn Leu Ser Val Leu Arg Ser Phe Arg Leu Leu Arg Val Phe 805 810 815

Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Thr Leu Ile Lys Ile Ile 820 825 830

Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val Leu Ala Ile 835 840 845

Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe Gly Lys Asn 850 850 860

Tyr Ser Glu Leu Arg Asp Ser Asp Ser Gly Leu Leu Pro Arg Trp His 865 870 875

Met Met Asp Phe Phe His Ala Phe Leu Ile Ile Phe Arg Ile Leu Cys 885 890 895

Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met Glu Val Ser Gly Gln 900 905 910

Ser Leu Cys Leu Leu Val Phe Leu Leu Val Met Val Ile Gly Asn Leu 915 920 925

Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu Ser Ser Phe Ser Ala 930 935 940

Asp Asn Leu Thr Ala Pro Asp Glu Asp Arg Glu Met Asn Asn Leu Gln 945 950 955

Leu Ala Leu Ala Arg Ile Gln Arg Gly Leu Arg Phe Val Lys Arg Thr 970 975

Thr Trp Asp Phe Cys Cys Gly Leu Leu Arg His Arg Pro Gln Lys Pro 980 985 990

Ala Ala Leu Ala Ala Gln Gly Gln Leu Pro Ser Cys Ile Ala Thr Pro 995 1000 1005

Tyr Ser Pro Pro Pro Pro Glu Thr Glu Lys Val Pro Pro Thr Arg Lys 1010 1015 1020

Glu Thr Gln Phe Glu Glu Gly Glu Gln Pro Gly Gln Gly Thr Pro Gly 1025 1030 1035 1040

Asp Pro Glu Pro Val Cys Val Pro Ile Ala Val Ala Glu Ser Asp Thr 1045 1050 1055

Asp Asp Gln Glu Glu Asp Glu Glu Asn Ser Leu Gly Thr Glu Glu Glu 1060 1065 1070

Ser Ser Lys Gln Gln Glu Ser Gln Pro Val Ser Gly Trp Pro Arg Gly 1075 1080 1085

Pro Pro Asp Ser Arg Thr Trp Ser Gln Val Ser Ala Thr Ala Ser Ser 1090 1095 1100

Glu Ala Glu Ala Ser Ala Ser Gln Ala Asp Trp Arg Gln Gln Trp Lys 1105 1110 1115 1120

Ala Glu Pro Gln Ala Pro Gly Cys Gly Glu Thr Pro Glu Asp Ser Cys 1125 1130 1135

- Ser Glu Gly Ser Thr Ala Asp Met Thr Asn Thr Ala Glu Leu Leu Glu 1140 1145 1150
- Gln Ile Pro Asp Leu Gly Gln Asp Val Lys Asp Pro Glu Asp Cys Phe 1155 1160 1165
- Thr Glu Gly Cys Val Arg Arg Cys Pro Cys Cys Ala Val Asp Thr Thr 1170 1175 1180
- Gln Ala Pro Gly Lys Val Trp Trp Arg Leu Arg Lys Thr Cys Tyr His 1185 1190 1195 1200
- Ile Val Glu His Ser Trp Phe Glu Thr Phe Ile Ile Phe Met Ile Leu 1205 1210 1215
- Leu Ser Ser Gly Ala Leu Ala Phe Glu Asp Ile Tyr Leu Glu Glu Arg 1220 1225 1230
- Lys Thr Ile Lys Val Leu Leu Glu Tyr Ala Asp Lys Met Phe Thr Tyr 1235 1240 1245
- Val Phe Val Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Gly Phe Lys 1250 1255 1260
- Lys Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp 1265 1270 1275 1280
- Val Ser Leu Val Ser Leu Val Ala Asn Thr Leu Gly Phe Ala Glu Met 1285 1290 1295
- Gly Pro Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro Leu Arg 1300 1305 1310
- Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Asn Ala Leu Val 1315 1320 1325
- Gly Ala Ile Pro Ser Ile Met Asn Val Leu Leu Val Cys Leu Ile Phe 1330 1335 1340
- Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu Phe Ala Gly Lys Phe 1345 1350 1355 1360
- Gly Arg Cys Ile Asn Gln Thr Glu Gly Asp Leu Pro Leu Asn Tyr Thr 1365 1370 1375
- Ile Val Asn Asn Lys Ser Gln Cys Glu Ser Leu Asn Leu Thr Gly Glu 1380 1385 1390
- Leu Tyr Trp Thr Lys Val Lys Val Asn Phe Asp Asn Val Gly Ala Gly 1395 1400 1405
- Tyr Leu Ala Leu Leu Gln Val Ala Thr Phe Lys Gly Trp Met Asp Ile 1410 1415 1420
- Met Tyr Ala Ala Val Asp Ser Arg Gly Tyr Glu Glu Gln Pro Gln Trp 1425 1430 1435 1440
- Glu Tyr Asn Leu Tyr Met Tyr Ile Tyr Phe Val Ile Phe Ile Ile Phe 1445 1450 1455
- Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn 1460 1465 1470

Phe Asn Gln Gln Lys Lys Leu Gly Gly Gln Asp Ile Phe Met Thr 1475 1480 1485

Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys

Lys Pro Gln Lys Pro Ile Pro Arg Pro Leu Asn Lys Tyr Gln Gly Phe 1505 1510 1515 1520

Ile Phe Asp Ile Val Thr Lys Gln Ala Phe Asp Val Thr Ile Met Phe 1525 1530 1535

Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp Asp Gln
1540 1545 1550

Ser Pro Glu Lys Ile Asn Ile Leu Ala Lys Ile Asn Leu Leu Phe Val 1555 1560 1565

Ala Ile Phe Thr Gly Glu Cys Ile Val Lys Leu Ala Ala Leu Arg His 1570 1575 1580

Tyr Tyr Phe Thr Asn Ser Trp Asn Ile Phe Asp Phe Val Val Val Ile 1585 1590 1595 1600

Leu Ser Ile Val Gly Thr Val Leu Ser Asp Ile Ile Gln Lys Tyr Phe 1605 1610 1615

Phe Ser Pro Thr Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg 1620 1625 1630

Ile Leu Arg Leu Ile Arg Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe 1635 1640 1645

Ala Leu Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu 1650 1655 1660

Phe Leu Val Met Phe Ile Tyr Ser Ile Phe Gly Met Ala Asn Phe Ala 1665 1670 1680

Tyr Val Lys Trp Glu Ala Gly Ile Asp Asp Met Phe Asn Phe Gln Thr 1685 1690 1695

Phe Ala Asn Ser Met Leu Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly 1700 1705 1710

Trp Asp Gly Leu Leu Ser Pro Ile Leu Asn Thr Gly Pro Pro Tyr Cys 1715 1720 1725

Asp Pro Thr Leu Pro Asn Ser Asn Gly Ser Arg Gly Asp Cys Gly Ser 1730 1735 1740

Pro Ala Val Gly Ile Leu Phe Phe Thr Thr Tyr Ile Ile Ile Ser Phe 1745 1750 1760

Leu Ile Val Val Asn Met Tyr Ile Ala Ile Ile Leu Glu Asn Phe Ser 1765 1770 1775

Val Ala Thr Glu Glu Ser Thr Glu Pro Leu Ser Glu Asp Asp Phe Asp 1780 1785 1790

Met Phe Tyr Glu Ile Trp Glu Lys Phe Asp Pro Glu Ala Thr Gln Phe 1795 1800 1805 Ile Glu Tyr Ser Val Leu Ser Asp Phe Ala Asp Ala Leu Ser Glu Pro 1810 1815 1820

Leu Arg Ile Ala Lys Pro Asn Gln Ile Ser Leu Ile Asn Met Asp Leu 1825 1830 1835 1840

Pro Met Val Ser Gly Asp Arg Ile His Cys Met Asp Ile Leu Phe Ala 1845 1850 1855

Phe Thr Lys Arg Val Leu Gly Glu Ser Gly Glu Met Asp Ala Leu Lys 1860 1865 1870

Ile Gln Met Glu Glu Lys Phe Met Ala Ala Asn Pro Ser Lys Ile Ser 1875 1880 1885

Tyr Glu Pro Ile Thr Thr Leu Arg Arg Lys His Glu Glu Val Ser 1890 1895 1900

Ala Met Val Ile Gln Arg Ala Phe Arg Arg His Leu Leu Gln Arg Ser 1905 1910 1915 1920

Leu Lys His Ala Ser Phe Leu Phe Arg Gln Gln Ala Gly Ser Gly Leu 1925 1930 1935

Ser Glu Glu Asp Ala Pro Glu Arg Glu Gly Leu Ile Ala Tyr Val Met 1940 1945 1950

Ser Glu Asn Phe Ser Arg Pro Leu Gly Pro Pro Ser Ser Ser Ser Ile 1955 1960 1965

Ser Ser Thr Ser Phe Pro Pro Ser Tyr Asp Ser Val Thr Arg Ala Thr 1970 1975 1980

Ser Asp Asn Leu Gln Val Arg Gly Ser Asp Tyr Ser His Ser Glu Asp 1985 1990 1995 2000

Leu Ala Asp Phe Pro Pro Ser Pro Asp Arg Asp Arg Glu Ser Ile Val2005 2010 2015